ISO TC 184/SC4 QUALITY COMMITTEE DOCUMENT

Technical Committee 184 for Industrial Automation Systems and Integration

Subcommittee 4 for Industrial Data

TC 184/SC4 Quality ~~Handbook~~ Manual

~~Allison Barnard Feeney~~

~~Jesse L. Crusey~~

ISO TC 184/SC4 Quality Committee

National Institute of Standards and Technology

Building 220/Room A127

Gaithersburg, Maryland 20899

USA

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TC 184/SC4 Quality ~~Handbook~~Manual

1. Introduction

The Quality Committee has established a quality system for SC4 for developing quality standards.   Quality goals for SC4 include

— the overall consistency of standards products of SC4 and components of these standards, in particular, conformance to ISO and SC4-approved directives for presentation of standards;

— the completeness of each standards product of SC4; and

— the understandability of each standards product of SC4 by those who review the technical content of the standard, implement the standard in software products, and test implementations of the standard.

This handbook is the cornerstone of the SC4 quality system and defines the specifications, quality assessment criteria, and approval procedures that support built-in quality for all SC4 standards products. This handbook is intended to be used as a guide by the project development team in developing standards products.

1.1 Objectives

The objectives of the ~~SC4 quality handbook~~ *SC4 Quality Manual* are

— to provide SC4 projects with a stable document that enumerates the specifications, quality assessment criteria, and approval processes that are used to achieve quality standards;

— to ensure that tasks are done to a consistently high level of quality within SC4;

— to provide a foundation for improving quality practices within SC4; and

— to provide objective evidence for determining and correcting the causes of poor quality.

1.2 Quality management versus quality assurance

In developing any product, it is necessary to pay attention to quality. Attention to quality is equally important when the product is a standard. Lack of quality in a proposed standard impedes adequate technical review, allows for misunderstanding, and causes delays in adopting the standard. You should focus attention on quality in two places: 1) on inspecting the product (i.e. a draft standard) at specific points in time during its development; and 2) on the process, procedures, tools and techniques that ensure quality in the development of standards.

Historically, the focus of review within SC4 has been on the ~~first of these, the~~external inspection of the parts of ISO 10303. The current focus is on internal inspection based on a more detailed description of the quality process, coupled with the introduction of simpler quality metrics and rigorous audit where projects fail to satisfy the criteria expressed in those metrics.~~on the second, enabling quality part development~~, as well as on extending the scope of reviews to cover all standards products of SC4.~~.~~

The distinction between a focus on quality as a development activity and as an inspection activity can be viewed respectively as quality management and quality assurance. The first

term, *quality management*, entails the existence of procedures and assessments to ensure that the quality of the product results from applying accepted product development methods. *Quality assurance* is a post-production or in-process inspection activity that may use the same assessments and criteria as above, but which you perform with a different set of procedures. These procedures address only evaluating a product as opposed to providing product development procedures for all aspects of the development process.

2. Scope

This scope of this document includes all SC4 standards:

ISO 10303	Product data representation and exchange;
ISO 13584	Parts library;
ISO 15531	Manufacturing management data; and
ISO 15926	Integration of lifecycle data for oil and gas production facilities.

This document defines the quality-related responsibilities assigned to key roles within SC4.

This document presents the elements required to assess and improve the quality of an SC4 part.

The following are within the scope of this document:

— assignment of responsibilities in areas such as quality reviews, training, and tool selection and use;

— ~~identifying~~ the sources of specifications for developing the various portions of the SC4 parts;

— ~~identifying~~ the sources of quality assessment criteria that you are to use to verify the technical ~~consistency~~ quality of a part, e.g., ~~the format and structure of the part document,~~ the relevance, clarity and consisteny of ideas, definitions, examples, graphical models, ~~and~~ illustrations, and ~~the correctness of~~ other technical elements~~such as usage and syntax of EXPRESS and IDEF0~~;

— the sources of quality assessment criteria that you are to use to verify the document quality, e.g., the format and structure of the part document and the clarity of ideas, definitions, examples, graphical models, and illustrations;

— identifying documented procedures governing the review and approval of the above standards; and

— identifying references to checklists for use in reviewing different parts of each of the above standards.

The following are ~~outside the scope of this document~~within the scope of the SC4 Quality Manual, but are provided under separate cover:

— part development integration and interpretation procedures;

— assessment criteria for evaluation of the accuracy or technical content of a part;

— definition of requirements SC4 standards shall meet;

NOTE - The requirements for parts are derived from documents approved by SC4. Clauses 4-8 list the primary references that contain these requirements.

— the part development, integration, or interpretation procedures used within SC4; and

— the overall procedures for developing and approving standards products within SC4.

3. Terms, definitions, and abbreviations

3.1 Terms defined in 10303-1

For the purposes of this document the terms defined in ISO 10303-1 apply.

— abstract test suite (ATS);

— application activity model (AAM);

— application interpreted construct (AIC);

— application interpreted model (AIM);

— application protocol (AP);

— application reference model (ARM); and

— integrated resource (IR).

3.2 Terms defined in 10303-202

For the purposes of this document the following term defined in ISO 10303-202 applies.

— application interpreted construct (AIC).

3.3 Other terms and definitions

For the purposes of this document, the following definitions apply.

3.3.1
audit
???

3.3.2
corrective action
???

3.3.~~3~~1
defect
a feature of the standards product that does not conform to the specification.

3.3.~~4~~2
quality
the totality of features and characteristics of a product or service that bears upon its ability to satisfy stated or implied needs. [8042]

3.3.~~5~~3
quality assurance
collecting actions that gives confidence to the customer that the quality policy has been achieved. Quality assurance has two main parts: the quality of the organization (using ISO 9000) and the quality of the products and the services (using product quality standards).

3.3.~~6~~4
quality management
managing the level of defects that occurs as a result of some process.

3.3.~~7~~5
specification
the description of the features that are relevant to customer satisfaction, and that are relevant to the intended purpose.

4. Roles and responsibilities

4.1 Quality management system

The Quality Committee maintains the SC4 quality management system. This system includes the *SC4 Quality ~~Handbook~~ Manual* (this document), checklists for project leader and convener approval, quality assessment criteria for use in project reviews, and approved SC4 methods documents that provide requirements on technical and editorial development of SC4 standards products.

Project teams are responsible for providing feedback to the Quality Committee for improvements to the review process, approval check lists, methods documents and training materials.

4.2 Quality reviews

Project teams and working groups are responsible for part quality. Project teams and working groups are responsible for coordinating and conducting part reviews, documenting review processes used, issues raised, resolution of issues, deferment of issues, and quality methods used.

Project teams are responsible for following SC4-approved methods documents when developing their parts and for conducting internal reviews at appropriate points during part development.

Project leaders are responsible for conducting part reviews prior to publication. Project leaders shall sign-off that parts are of acceptably high quality for release.

Conveners are responsible for conducting part reviews following the project leader sign-off. Conveners shall sign-off that parts are of acceptably high quality for release.

Quality Committee will conduct audits of part quality at selected points in the part development cycle. The audits will be queries on quality processes used and results obtained. Ideally, the audits will not include inspection of the part documentation. The nature and frequency of the audits will vary.

4.3 Training

SC4's policy on training is that each project team developing an SC4 standard is fully trained in the methods needed to ensure high quality standards. The project leader for each standard is responsible for implementing this policy within the project. Project team members are responsible for identifying requirements for training necessary to successful delivery of quality standards. The Quality Committee provides guidance and support to project teams, and audits compliance with training requirements.

It is the responsibility of the project leader to ensure that project team members have the necessary skills to carry out their tasks.

The Quality Committee supports the project leader by

— defining the necessary skills for various roles within the team;

— providing methods to measure an individuals skill level;

— ensuring the availability of training to develop certain necessary skills; and

— auditing the existence of necessary skills within the project team.

The Quality Committee provides an *SC4 training program*[1] that provides details regarding training requirements and opportunities.

The Quality Committee reserves the power to remove sign-off authority from the project team or leader, if requests to improve skill levels are not acted upon.

4.4 Tools

It is the responsibility of the project leader to ensure that the development, authoring, and publishing tools used on the project are appropriate to the task, and that any necessary configuration of these tools (e.g. style sheets in the case of authoring tools) is undertaken correctly.

The Quality Committee supports the project leader by providing guidelines on the selection and use of tools, by providing approved style sheets, and by encouraging exchange of experiences between projects.

5. SC4 part requirements

Whether you use quality assessment criteria as a development aid or as a quality inspection tool, it is essential that the requirements for approval of SC4 standards be specified. The value of the quality system within SC4 depends upon

— the existence, acceptance, and dissemination of quality requirements for standards development;

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[1] Initial draft available: http://www.nist.gov/sc4/wg_qc/qc/qcn046/. Initial statement of skills, metrics, and training opportunities are included for review in annex B of this document. They will be incorporated into the SC4 training program.

— the existence, acceptance, and dissemination of quality requirements for standards products;

— the understanding, practical application, and consistent use of these quality requirements by standards' developers.

Each class of part contains categories of material that are governed by different specifications and are subject to different evaluations. Some categories of material, such as the scope, normative references, and definitions, apply to all parts. Some categories of material, such as application reference models, apply to only one class of parts. SC4 parts may be divided into five classes:

— text parts (10303-1-30s, some parts of 13584, 15531, and 15926);

— ~~integrated~~ common resource parts (ISO 10303-40s and 100s, 13584-20s, 15531-40s);

— application protocol parts (ISO 10303-200s);

— abstract test suite parts (ISO 10303-300s); and

— application interpreted construct parts (ISO 10303-500s).

Development and documentation details for a particular class of part are documented in the various SC4 Standing Documents referenced in the class-specific clauses. Project teams use these Standing Documents to develop correct parts while the Quality Committee uses them to derive the quality assessment criteria that evaluate SC4 parts. The Standing Documents are accepted and modified by SC4 resolution.[2]

The quality assessment criteria that evaluate each class of part are documented in *Procedures for internal review* [INTREV]. *Procedures for internal review* is intended to provide a comprehensive set of quality criteria organized to direct assessing a part. These procedures will be continuously improved through feedback from their users.

5.1 Text parts

Text parts include the 1-30-series parts of ISO 10303, as well as parts of ISO 13584, ISO 15531, and ISO 15926.

5.1.1 Specifications

In order to develop a high-quality standard, the part editors must read, understand, and apply the following documents:

— *Concise Oxford Dictionary of Current English* [COED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SD].

Additionally, the project development team must read and apply any of the following documents that are applicable when developing the parts.

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[2] At the time of publication, the specific versions of the documents referenced herein were correct. See http://www.nist.gov/sc4/www/necsdocs.htm for a regularly updated listing of current versions.

If the part includes EXPRESS, also read and apply

— *Description methods: The EXPRESS language reference manual* [10303-11].

If the part includes physical files, also read and apply

— *Implementation methods: Clear text encoding of the exchange structure* [10303-21].

If the part relates to conformance testing and abstract test suite specification, also read and apply

— *Guidelines for the development of abstract test suites* [ATSG].

NOTE - There are no specific methods documents that apply to these standards. As specific methods become available, they will be referenced.

5.1.2 Review criteria

The project development team must verify that the document meets the above specifications by using the *Procedures for internal review* [INTREV].

5.1.3 Approval

The project leader must verify that the document meets the above specifications by using the *Project leader approval checklist for SC4* [PLAC], unless the part is a part of ISO 15926. If the part is a part of ISO 15926, the project leader must verify that the document meets the above specifications using the *ISO 15926 quality checklist* [OGC].

The convener must verify that the document meets the above specifications using the *Convener approval checklist for SC4* [CAC].

5.1~~5.2~~ ~~Integrated~~ Common resources

~~Integrated~~ Common resources include~~s~~ the 40- and 100-series parts of ISO 10303, the 20-series parts of 13584, and the 40-series parts of 15531.

5.1.1~~5.2.1~~ Specifications

In order to develop a high-quality ~~integrated~~ common resource, the part editors must read, understand, and apply the following documents:

— *Concise Oxford Dictionary of Current English* [COED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [~~10303~~SD]~~.;~~

The project development team must read and apply the following document when developing the ~~integrated~~ common resource:

— *Description methods: The EXPRESS language reference manual* [10303-11].

⸺ *STEP (Standard for the Exchange of Product Model Data) Resource Integration: Semantic & Syntactic Rules* [INTEG]

~~5.1.2~~5.2.2 Review criteria

~~You will find general information on part reviews in *SC4 part review procedure* [PREV].~~

The project development team must verify that the document meets the above specifications using the ~~*SC4 quality process manual* [QPROC] and the~~ *Procedures for internal review* [INTREV].

~~5.1.3~~5.2.3 Approval

The project leader must verify that the document meets the above specifications by using the *Project leader approval checklist for SC4* [PLAC].

The convener must verify that the document meets the above specifications by using the *Convener approval checklist for SC4* [CAC].

~~5.2~~5.3 Application protocols

Application protocols ~~include~~ are the 200-series parts of ISO 10303.

~~5.2.1~~5.3.1 Specifications

In order to develop a high-quality application protocol, the part editors must read, understand, and apply the following documents:

⸺ *Concise Oxford Dictionary of Current English* [COED];

⸺ *ISO/IEC Directives, Part 3* [IDP3];

⸺ terninology standards, dictionaries, text books, etc. that are relevant to the domain of the AP; and

⸺ *Supplementary directives for the drafting and presentation of ISO 10303* [SD].~~;~~

The project development team must read and apply the following documents when developing the various sections of an application protocol:

⸺ *Guidelines for the development and approval of STEP application protocols* [APG];

⸺ *Guidelines for the development of abstract test suites* [ATSG];

⸺ *Description methods: The EXPRESS language reference manual* [10303-11];

⸺ *Integration Definition for Function Modeling (IDEF0)* [IDEF0];

⸺ *Guidelines for the development of mapping tables* [MTG];

⸺ *Guidelines for application interpreted model development* [AIMG];

⸺ *Procedures for application interpretation* [APPINT]; and

— *Conformance testing methodology and framework: General concepts* [10303-31].

If you use IDEF1X to graphically represent the application reference model of the application protocol, also read and apply

— *Integration Definition for Information Modeling (IDEF1X)* [IDEF1X].

If you use application interpreted constructs in documenting the application protocol, also read and apply

— *Guidelines for application interpreted construct development* [AICG].

5.2.25.3.2 Review criteria

You will find general information on part reviews in *SC4 part review procedure* [PREV].

The project development team must verify that the document meets the above specifications by using the *SC4 quality process manual* [QPROC] and the *Procedures for internal review* [INTREV].

5.2.35.3.3 Approval

The project leader must verify that the document meets the above specifications by using the *Project leader approval checklist for SC4* [PLAC].

The convener must verify that the document meets the above specifications by using the *Convener approval checklist for SC4* [CAC].

5.35.4 Abstract test suites

Abstract test suites include are the 300-series parts of ISO 10303.

5.3.15.4.1 Specifications

In order to develop a high-quality abstract test suite, the part editors must read, understand, and apply the following documents:

— *Concise Oxford Dictionary of Current English* [COED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SD].;

The project development team must read and apply the following documents when developing the various sections of an abstract test suite:

— *Guidelines for the development of abstract test suites* [ATSG];

— *Conformance testing methodology and framework: General concepts* [10303-31]; and

— *Conformance testing methodology and framework: Requirements on testing laboratories and clients* [10303-32].

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If the ATS uses physical files for specifying test cases, also read and apply the following documents:

— *Implementation methods: Clear text encoding of the exchange structure* [10303-21]; and

— *Conformance testing methodology and framework: Abstract test methods* [10303-34].

If the ATS uses EXPRESS-I for describing test cases, also read and apply

— *Description methods: The EXPRESS-I language reference manual* [10303-12].

If the ATS references SDAI as an implementation form, also read and apply the following documents:

— *Implementation methods: Standard data access interface specification* [10303-22]. ~~; and~~

~~— Conformance testing methodology and framework: Abstract test methods for SDAI implementations [10303-35].~~

~~5.3.2~~5.4.2 Review criteria

~~You will find general information on part reviews in *SC4 part review procedure* [PREV].~~

The project development team must verify that the document meets the above specifications by using ~~the *SC4 quality process manual* [QPROC]~~ and the *Procedures for internal review* [INTREV].

~~5.3.3~~5.4.3 Approval

The project leader must verify that the document meets the above specifications by using the *Project leader approval checklist for SC4* [PLAC].

The convener must verify that the document meets the above specifications by using the *Convener approval checklist for SC4* [CAC].

~~5.4~~5.5 Application interpreted constructs

Application interpreted constructs ~~include~~ are the 500-series parts of ISO 10303.

~~5.4.1~~5.5.1 Specifications

In order to develop a high-quality application integrated construct, the part editors must read, understand, and apply the following documents:

— *Concise Oxford Dictionary of Current English* [COED];

— *ISO/IEC Directives, Part 3* [IDP3]; and

— *Supplementary directives for the drafting and presentation of ISO 10303* [SD].

The project development team must read and apply the following documents when developing the various sections of an application interpreted construct:

— *Guidelines for the development of application interpreted constructs* [AICG];

—— *Description methods: The EXPRESS language reference manual* [10303-11];

—— *Guidelines for application interpreted model development* [AIMG]; and

—— *Procedures for application interpretation* [APPINT].

If components of an ATS are to be included in the documentation of the AIC, also read and apply any of the following documents that are applicable:

—— *Guidelines for the development of abstract test suites* [ATSG];

—— *Implementation methods: Clear text encoding of the exchange structure* [10303-21]; and

—— *Description methods: The EXPRESS-I language reference manual* [ISO/TR10303-12].

~~5.4.2~~5.5.2 Review criteria

~~You will find general information on part reviews in *SC4 part review procedure* [PREV].~~

The project development team must verify that the document meets the above specifications by using ~~the *SC4 quality process manual* [QPROC] and~~ the *Procedures for internal review* [INTREV].

~~5.4.3~~5.5.3 Approval

The project leader must verify that the document meets the above specifications by using the *Project leader approval checklist for SC4* [PLAC].

The convener must verify that the document meets the above specifications by using the *Convener approval checklist for SC4* [CAC].

~~5.5~~ ~~Text parts~~

~~Text parts include the 1-30 series parts of ISO 10303, as well as parts of ISO 13584, ISO 15531, and ISO 15926.~~

~~5.5.1~~ ~~Specifications~~

~~In order to develop a high quality standard, the part editors must read, understand, and apply the following documents:~~

~~—— *Concise Oxford Dictionary of Current English* [COED];~~

~~—— *ISO/IEC Directives, Part 3* [IDP3]; and~~

~~—— *Supplementary directives for the drafting and presentation of ISO 10303* [SD];~~

~~Additionally, the project development team must read and apply any of the following documents that are applicable when developing the parts.~~

~~If the part includes EXPRESS, also read and apply~~

~~—— *Description methods: The EXPRESS language reference manual* [10303-11].~~

~~If the part includes physical files, also read and apply~~

— *Implementation methods: Clear text encoding of the exchange structure* [10303-21].

If the part relates to conformance testing and abstract test suite specification, also read and apply

— *Guidelines for the development of abstract test suites* [ATSG].

NOTE   There are no specific methods documents that apply to these standards. As specific methods become available, they will be referenced.

5.5.2 Review criteria

You will find general information on part reviews in *SC4 part review procedure* [PREV].

The project development team must verify that the document meets the above specifications by using the *SC4 quality process manual* [QPROC] and the *Procedures for internal review* [INTREV].

5.5.3 Approval

The project leader must verify that the document meets the above specifications by using the *Project leader approval checklist for SC4* [PLAC], unless the part is a part of ISO 15926. If the part is a part of ISO 15926, the project leader must verify that the document meets the above specifications using the *ISO 15926 quality checklist* [OGC].

The convener must verify that the document meets the above specifications using the *Convener approval checklist for SC4* [CAC].

Annex A

References

[IDEF0]   Federal Information Processing Standard Publication 183, *Integration Definition for Function Modeling (IDEF0),* FIPS PUB 183, National Institute of Standards and Technology, December 1993.

[IDEF1X]   Federal Information Processing Standard Publication 184, *Integration Definition for Information Modeling (IDEF1X),* FIPS PUB 184, National Institute of Standards and Technology, December 1993.

[IDP3]   *ISO/IEC Directives, Part 3, Rules for the structure and drafting of International Standards,* Third edition, 1997.

[8042]   ISO 8042:1996, *Quality vocabulary*

[9000-1]   ISO 9000-1:1994, *Quality management and quality assurance standards ¾ Part 1: Guidelines for selection and use*

[9004-1]   ISO 9004-1:1994, *Quality management and quality system elements ¾ Part 1: Guidelines*

[10303-11]   ISO 10303-11:1994, *Description methods: The EXPRESS language reference manual*

[10303-12]   ISO/TR 10303-12, *Description methods: The EXPRESS-I language reference manual*

[10303-21]   ISO 10303-21:1994, Implementation methods: Clear text encoding of the exchange structure

[10303-22]   ISO 10303-22:1998, *Implementation methods: Standard data access interface specification*

[10303-31]   ISO 10303-31:1994, *Conformance testing methodology and framework: General concepts*

[10303-32]   ISO 10303-32:1998, *Conformance testing methodology and framework: Requirements on testing laboratories and clients*

[10303-34]   ISO 10303-34, *Conformance testing methodology and framework: Abstract test methods*

[10303-35]   ISO 10303-35, *Conformance testing methodology and framework: Abstract test methods for SDAI implementations*

[COED]   *Concise Oxford Dictionary of Current English, Ninth Edition, 1995*

[PREV]   ISO TC 184/SC4/QC N007:1996, *SC4 Part Review Procedure*, 1996/08/15

[CAC]   ISO TC 184/SC4/QC N099:1999 *Conveners Approval Checklist for ISO 10303*

[PLAC]   ISO TC 184/SC4/QC N100:1999, *Project Leader Approval Checklist for ISO 10303*

[APPINT] ISO TC 184/SC4/QC N027:1997, *Procedures for application interpretation*

[OGC]   ISO TC 184/SC4/QC N051:1998, *ISO 15926 quality checklist*

[QPROC]   ISO TC 184/SC4/QC N052:1998, *SC4 quality process manual*

[INTREV] ISO TC 184/SC4/QC N088:1998, *SC4 procedures for internal review*

[INTEG]   ISO TC 184/SC4 N80, *STEP (Standard for the Exchange of Product Model Data) Resource Integration: Semantic & Syntactic Rules*

[AIMG]   ISO/TC 184/SC4 N532:1997, *Guidelines for application interpreted model development.*

[MTG]   ISO/TC 184/SC4 N533:1997, *Guidelines for the development of mapping tables.*

[AICG]   ISO/TC 184/SC4 N534:1997, *Guidelines for application interpreted construct development.*

[APG]   ISO/TC 184/SC4 N535:1998, *Guidelines for the development and approval of STEP application protocols.*

[ATSG]   ISO/TC 184/SC4 N536:1997, *Guidelines for the development of abstract test suites.*

[SD]   ISO/TC 184/SC4 N537:1997, *Supplementary directives for the drafting and presentation of ISO 10303.*

[HANDBK] ISO TC 184/SC4 N679:1998, *ISO TC 184/SC4 organization handbook.*

Annex B

Training Requirements

The individual roles within the project team, the skill requirements for each role, the methods of measurement, and relevant training opportunities are provided below. This material belongs in the SC4 Training Program.

- **Convener**

  Skills required: Familiarity with ISO/IEC Directives (Parts 1 & 3), SC4 Organization Handbook, SC4 Quality Manual, and any SC4-approved methods documents that apply to the type of standard being developed within the working group, such as ISO 10303 and SC4 Supplementary Directives,.

  Method of measurement: Self assessment, recorded *in Convener Approval Checklist for SC4* [CAC].

  Relevant training:

- **Project leader**

  Skills required: Project management experience, familiarity with ISO/IEC Directives (Parts 1 & 3), SC4 Organization Handbook, ISO 10303 and SC4 Supplementary Directives, ~~SC4 Quality Handbook~~SC4 Quality Manual, Procedures for Internal Review, and any specific guidelines or procedures that apply to the type of standard being developed.

  Method of measurement: Self assessment, recorded *in Project Leader Approval Checklist for SC4* [PLAC].

  Relevant training: AP and ATS / SC4 development guidelines workshop.

- **Part editor**

  Skills required: Highly skilled in written and spoken English . Qualification or experience in technical writing. Skill with the authoring tool selected for use on the project. Familiarity with *ISO/IEC Directives Part 3* [IDP3] and *Supplementary Directives for the drafting and presentation of ISO 10303, edition 2* [10303SD], and when available, the ISO TC184/SC4 Supplementary Directives

  Method of measurement: Self assessment, recorded *in Project Leader Approval Checklist for SC4* [PLAC]. The checklists contained in the *Procedures for Internal Review* [INTREV]. Inspection of style sheets.

  Relevant training: QC workshop 'Producing a standard that your reader can understand'; QC training course on Supplementary Directives;

- **Part reviewer (editorial)**

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Skills required: Highly skilled in written and spoken English .Qualification or experience in technical writing. Familiarity with *ISO/IEC Directives Part 3* [IDP3] and *Supplementary Directives for the drafting and presentation of ISO 10303, edition 2* [10303SD], and when available, the ISO TC184/SC4 Supplementary Directives.

Method of measurement: Self assessment, recorded in *Project Leader Approval Checklist for SC4* [PLAC]. The checklists contained in the *Procedures for Internal Review* [INTREV].

Relevant training: QC workshop 'Producing a standard that your reader can understand.'

- **Part reviewer (s) (technical usage)**

  Skills required: Familiarity with domain terminology

  Method of measurement: Self assessment, recorded in *Project Leader Approval Checklist for SC4* [PLAC].

  Relevant training: Industrial experience

- **Part reviewer (s) (technical methods)**

  Skills required: Experience with IDEF0. Experience with EXPRESS and EXPRESS- G. Knowledge of UoF's in other relevant standards. Knowledge of ATS development procedures to ensure consistency and accuracy of AP and to identify omissions.

  Method of measurement: Self assessment, recorded *in Project Leader Approval Checklist for SC4* [PLAC].

  Relevant training: QC workshop "Using the ATS process to enhance quality in an AP".

- **Interpretor (i.e for an AP, the person (s) who produce the mapping tables showing how each UoF and application object maps to one or more AIM constructs)**

  Skills required: In-depth experience of generic and integrated resources. In-depth experience of UoF's in other standards. In-depth experience of Interpretation practices.

  Method of measurement: The name of the person appointed to this task, their experience, and training shall be provided to the Quality Committee and the WG12 convener. Intermediate audits of the interpretation report by the Quality Committee may be carried out.

  Relevant training: Interpretation class

- **Integrator**

  Skills required: In-depth experience of generic, integrated, and SC4 common resources. In-depth experience of semantic and syntactic integration practices.

  Method of measurement: The name of the person appointed to this task, their experience, and training shall be provided to the Quality Committee and the WG12 convener.

  Relevant training:

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